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Baudina gen. nov., constituting the first record of Pasytheidae from Australia, and Sinoflustridae fam. nov., with a checklist of Bryozoa and Pterobranchia from Beagle Gulf

DENNIS P. GORDON

National Institute of Water and Atmospheric Research,
Private Bag 14901 Kilbirnie, Wellington, NEW ZEALAND
d.gordon@niwa.co.nz

ABSTRACT

Baudina gen. nov., comprising two new species from the Beagle Gulf of Australia's Northern Territory, is the first pasytheid bryozoan to be recorded from Australian continental waters. Colonies are wholly encrusting, forming uni- to triserial ramifying colonies. The zooids have the largest gymnocystal perforations of any other pasytheid, living or fossil. The new *Baudina* taxa constitute two of 84 bryozoan species so far known from Beagle Gulf, including Darwin Harbour. *Sinoflustra* Liu and Yang, 1995, a genus of uncertain affinity, is herein designated the type species of a new family, Sinoflustridae, which also includes *Membraniporopsis* Liu in Liu, Yin and Xia, 1999. The bryozoan diversity of the Beagle Gulf is small relative to what may be expected of tropical Indo-Pacific bryozoans for an area this size and it is likely that several hundred more species will be discovered upon further dedicated sampling.

KEYWORDS: Bryozoa, Pasytheidae, Sinoflustridae, new family, *Baudina*, new genus, Beagle Gulf, Darwin, Northern Territory, new genera, new species, taxonomy.

INTRODUCTION

This paper reports upon bryozoans collected in the Beagle Gulf by the former Conservation Commission of the Northern Territory (CCNT). A survey of the invertebrate fauna was made from the western side of Anson Bay (13°29.64′S, 129°51.00′E) to the eastern side of Cape Hotham (12°12.36′S, 131°23.22′E) in October 1993. The survey included 162 stations sampled by dredging in water depths of 4–39 m. Substrata sent to the author for examination included molluscan shell, and coral and bryozoan rubble. These were thoroughly examined for bryozoan diversity and a checklist of species was included as Appendix 3 in the final report of the survey by the then Parks and Wildlife Commission of the Northern Territory (Smit *et al.* 2000).

The bryozoan diversity in the samples is representative of the tropical Indo-Pacific bryozoan fauna, with most of the species covered in the four-volume series on Bryozoa in the Siboga Expedition Reports (Harmer 1915, 1926, 1934, 1957), for example. The most notable taxonomic discovery in the collection was two undescribed species representing a new genus of Pasytheidae, a family of cheilostome bryozoans not previously recorded in Australian continental waters. A forthcoming volume on Australian bryozoans in the Australian Biological Resources Study *Fauna of Australia* series, which aims to be comprehensive in its coverage, necessitates formal description of these new taxa so that they can be included in the *Fauna* volume.

The Pasytheidae currently comprises six genera. All are characterised by perforate gymnocystal frontal walls and the complete absence of ovicells and polymorphs like articulated oral spines and avicularia. Some species have stolons that ramify across the substratum and erect branches arise from these. The new genus discovered in the Beagle Gulf, is striking for the large size of the gymnocystal perforations and one of the two new species has a stout pair of non-articulated horn-like processes adjacent to the orifice. This paper formally describes the new genus and its constituent species and provides a checklist of all known species of bryozoans and pterobranchs in the vicinity of Darwin.

MATERIAL AND METHODS

Specimens collected during the survey were fixed in a 10% formalin-seawater solution on board the chartered fishing vessel *Kunmunyah* and later sorted by staff at the Museum and Art Gallery of the North Territory (NTM), Darwin.

The new bryozoan species described below were studied by scanning electron microscopy (SEM), using type and other specimens. Sorted material was immersed in sodium hypochlorite solution to remove all cuticularised membranes and dried soft parts in preparation for SEM. All specimens thus prepared were coated in gold-palladium and photographed using a LEO 440 SEM. Measurements of zooids were made directly from specimens using a light microscope (Zeiss Stereomicroscope SV-11) with an eyepiece graticule.

Primary types of the new species are lodged at NTM.

SYSTEMATICS

Order Cheilostomata Busk, 1852
Suborder Neocheilostomina d'Hondt, 1985
Superfamily Hippothooidea Busk, 1859
Family Pasytheidae Davis, 1934
Genus *Baudina* gen. nov.

Type species. *Baudina geographae* sp. nov.

Gender. Feminine.

Diagnosis. Colony encrusting, uni- to pluriserial, ramifying. Zooids with 5–15 relatively large gymnocystal perforations. Orifice circular, no condyles. Horn-like lateral-oral processes present or absent. No polymorphs or ovicells. Ancestrula with imperforate frontal gymnocyst. Budding of zooids lateral and/or distal.

Etymology. The genus name honours Nicolas-Thomas Baudin, captain, explorer and leader of the 1800–1804 expedition of *Géographe* and *Naturaliste* to Australia (Dunmore 1969; Horner 1987; Gordon *et al.* 1998). Baudin's voyage was tragically marred by the deaths of most of the savants on the voyage and by his own death from tuberculosis at Mauritius on the return trip; nevertheless, his expedition returned to Paris one of the most significant natural-history collections ever amassed during a single voyage. Owing to biased reporting of the expedition by François Péron, Baudin's name was deliberately omitted from the official account and his personal achievement was inadequately appreciated for more than a century. Surprisingly, his name has not previously been commemorated in a genus and it is my desire to correct this oversight.

Remarks. *Baudina* is clearly a member of the neocheilostome superfamily Hippothooidea, which comprises the hippothoomorph families Hippothoidae, Chorizoporidae, Trypostegidae and Pasytheidae. Allied with this group is the genus *Haplopoma* Levinsen, 1909. Often included in the lepralioid family Microporellidae (e.g. Hayward and Ryland 1999), it is gymnocystal-shielded and requires its own family. Although relatively character-poor, *Baudina* has distinctive features and the question is, to which of the above taxa is it most closely allied? Hippothoidae and Chorizoporidae are ruled out on two counts – all species in these families have ovicells and lack frontal gymnocystal perforations. Additionally, orifices are sinusoid in Hippothoidae and hemispherical in Chorizoporidae. Both species of *Baudina*, described below, have gymnocystal foramina and circular orifices and lack ovicells. Species of Trypostegidae and *Haplopoma* have gymnocystal perforations, but all genera have ovicells. Additionally, many trypostegids have avicularium-like zooidal polymorphs while *Haplopoma* species have an ascopore and well-developed basal pore-chambers; none of these characters is found in *Baudina*. Taking all characters into consideration, *Baudina* is closest to the Pasytheidae. All genera in this family have perforated frontal shields and lack ovicells and other polymorphs. Further, the orifice is typically weakly sinusoid or subcircular. *Baudina* differs from other pasytheids less in zooidal morphology than in colonial morphology. Pasytheids form ramifying colonies (like *Baudina*) but in these the zooids are mostly proximally attenuated, tending to claviform, are mostly basally jointed, and some species produce erect jointed branches, lacking in *Baudina*. Nevertheless, in general morphology, zooidal rows of *Baudina naturalistae* (below) are most similar to the unjointed linear chains of basal zooids in the pasytheid *Gemellipora eburnea* Smitt (see Gordon 1984; pl. 44A), which differs in the form of the orifice (slightly sinusoid, with condyles) and in having only tiny perforations and erect branches.

The family Pasytheidae currently comprises the genera *Pasythea* Lamouroux, 1812, *Dittosaria* Busk, 1866, *Gemellipora* Smitt, 1873, *Enteleia* Marcus, 1938, *Tecatia* Morris, 1980 and *Unifissurinella* Poignant, 1991, with *Baudina* only the seventh genus to be recognised. *Baudina* differs from all other pasytheid genera in the large size of the gymnocystal foramina; zooids are also proximally unjointed but joints are not universal in Pasytheidae.

***Baudina geographae* sp. nov.**

Figs 1–5

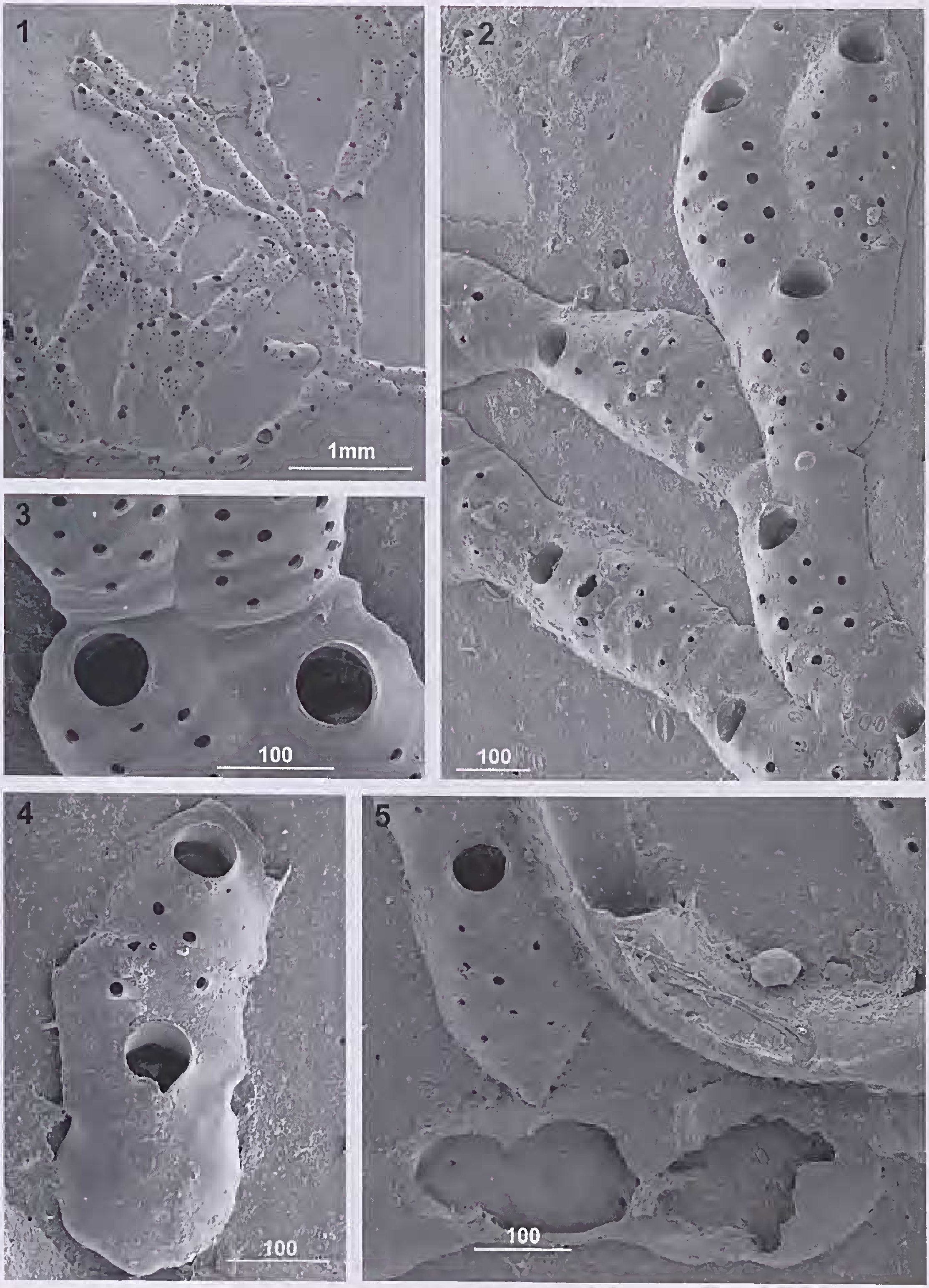
Holotype – NTM G.273 (unique specimen; no paratypes).

Type locality. CCNT Beagle Gulf station 103, off Charles Point, 12°18.96′S, 130°40.74′E, 23 m depth, attached to the interior surface near the umbo of a dead valve of the spiny oyster *Spondylus victoriae* G.B. Sowerby II, 1869 (Bivalvia: Spondylidae) from a sandy mud and gravel bottom.

Description. Colony encrusting, hyaline and inconspicuous, comprising uni- to pluriserial ramifying chains of zooids not more than 4 zooid rows wide.

Zooids small, 347–438 μm long, 156–224 μm wide, with a smooth frontal shield that may have a slightly undulating surface. Gymnocystal foramina from 6 (post-ancestrular zooid to 15 per zooid, relatively large, 9–19 μm diameter. Orifice circular to slightly subcircular, 57–77 μm diameter, with no condyles or peristome. No articulated spines or avicularia. No ovicells.

Ancestrula 250–262 μm long, 181–200 μm wide, with near-circular orifice 56–67 mm diameter; proximal end rounded, frontal shield smooth, imperforate, merging smoothly with gymnocyst of mid-distal daughter zooid.



Figs 1–5. *Baudina geographae* gen. nov., sp. nov., holotype: **1**, whole colony, showing uni-pluriserial rows of zooids; **2**, part of colony showing bifurcations of zooid rows; **3**, zooidal orifices; **4**, ancestrula (proximal rim of orifice damaged) and daughter zooid; **5**, damaged ancestrula (lower right) and daughter zooid, with a zooid row commencing from a lateral budding site on the daughter zooid. Scale bars in µm for Figs 2–5.

Further budding takes place mid-proximally from ancestrula and mid-distally from first daughter zooid, thus establishing a linear, uniserial chain in both directions; proximal end of daughter zooid originating from both sides of ancestrular orifice. Colony spread achieved by mid-lateral budding of some zooids in chain and by zooid bifurcation of those at each end of chain; zooids budded laterally have shortly tapering proximal ends. Ramifying zooid chains may merge and fuse.

Etymology. The species name alludes to the *Géographe*, one of the vessels of the Baudin expedition. It is intended as a noun in apposition.

Remarks. The unique holotype colony is known only from the type locality where it encrusted a shell fragment.

Baudina naturalistae sp. nov.

Figs 6–10

Holotype – NTM G.274. Paratype – NTM G.275, from same locality as holotype.

Type locality. CCNT Beagle Gulf station 103, off Charles Point, 12°18.96′S, 130°40.74′E, 23 m depth, on the erect branching bryozoan *Nellia tenella* from a sandy mud and gravel bottom.

Description. Colony encrusting, hyaline and inconspicuous, comprising uni- to biserial linear chains of zooids.

Zooids very small, 224–291 µm long, 112–123 µm wide, with very smooth frontal shield. Gymnocystal foramina relatively large, 12–24 µm diameter, 5–6 per zooid, their rims very slightly elevated. Orifice circular, 67–72 µm diameter, no condyles, rim sometimes very slightly elevated. A stout, hollow, non-articulated horn-like process at each distolateral corner of orifice; when fully developed these curve and taper toward each other, almost meeting, forming an arch across orifice. No articulated spines or avicularia. No ovicells.

Budding of zooids occurs distally, with branching occurring through the bifurcation of zooid rows. Ancestrula not seen.

Etymology. The species name alludes to the *Naturaliste*, the second of the vessels of the Baudin expedition that set out from France in 1800. It is intended as a noun in apposition.

Remarks. Colonies encrust erect branching cheilostome bryozoans. Two hosts have been encountered – *Nellia tenella* (Quadricellariidae) and *Scrupocellaria diadema* (Candidae), on both of which *B. naturalistae* may grow down the branch towards the substratum in the opposite growth direction to the host, or it may grow upwards in the same direction. On the latter host, *B. naturalistae* accommodates itself remarkably to the varied surface topography, with individual zooids achieving very twisted profiles (Fig. 10). The species is so far known only from the northeastern corner of Fog Bay to the Vernon Islands east of Cape Hotham at depths of 6 to 23 m.

Order Cheilostomata Busk, 1852a

Suborder Malacostegina Levinsen, 1902

Superfamily Membraniporoidea Busk, 1852b

Family Sinoflustridae fam. nov.

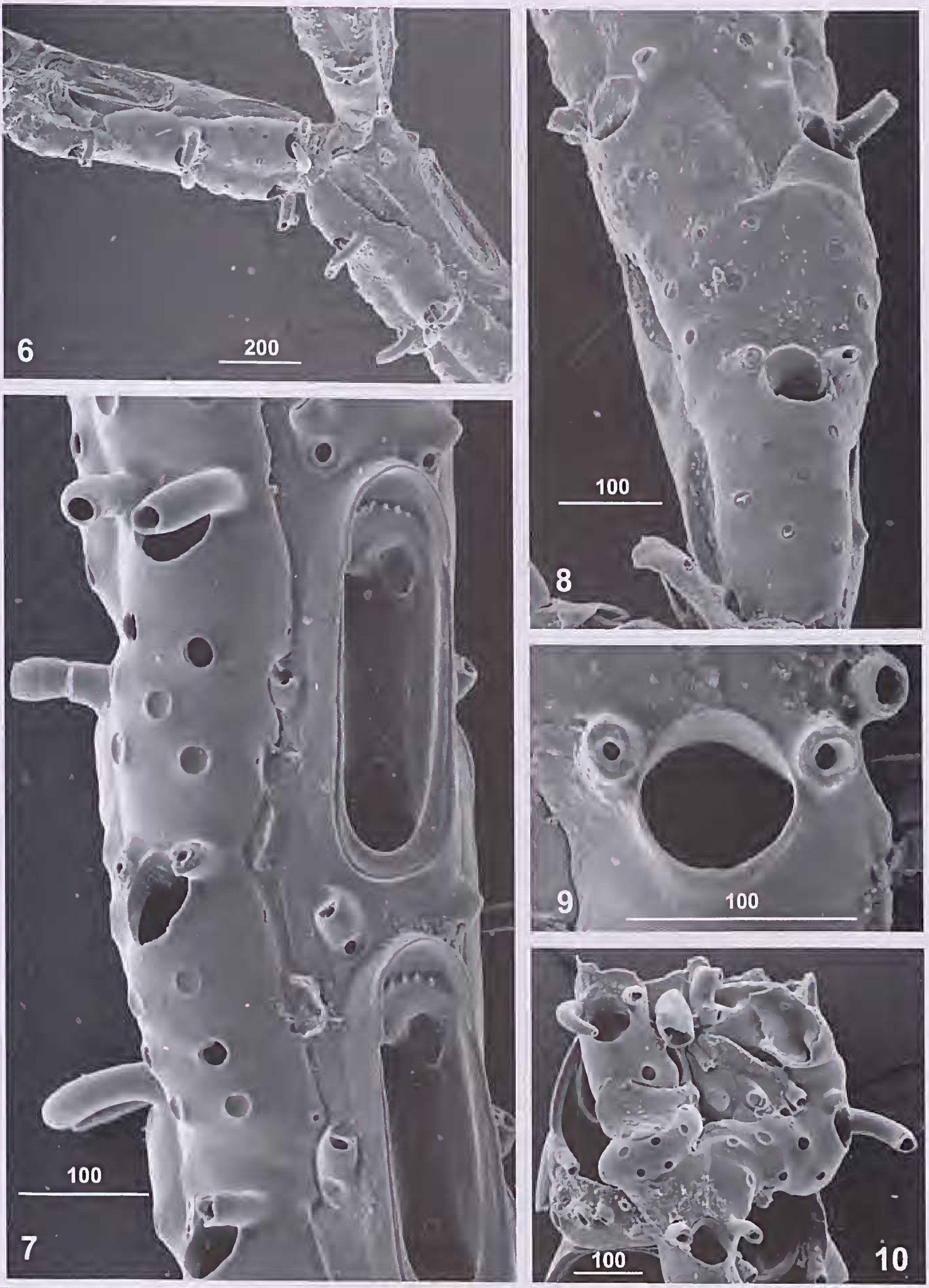
Diagnosis. Colony solely encrusting or producing erect unilaminar or bilaminar lobes or fronds from encrusting base. Zooids elongate-oval (neanic colonies) to rectangular, with a membranous frontal wall occupying entire frontal area. Cryptocyst narrow, usually granular, often developed more proximally and sometimes with horizontal spinous processes around opesia; gymnocyst typically absent but may be present or vestigial in periancestrular and some neanic zooids. Some zooids aviculariform, slightly larger than autozooids, expanded distally with large mandible-like opercula. Paired kenozooids budded distolaterally just below level of cryptocystal shelf but projecting frontalwards, having the form of short funnels or spines, with or without branching processes. Ancestrula single, bearing distolateral kenozooids. Reproduction involves many small ova, larval form unknown.

Type genus. *Sinoflustra* Liu and Yang, 1995.

Remarks. A specimen of *Sinoflustra amoyensis* (Robertson, 1921), the type species of *Sinoflustra*, was found at the Port of Darwin on an anthropogenic substratum in August 2002 and photographs of it were sent to the author for identification. The taxonomic status of this genus, and its family attribution, have been unclear and the opportunity is taken here to clarify the situation.

The species was originally described as *Membranipora amoyensis* by Robertson (1921) from Amoy (Xiamen), China, encrusting a molluscan shell in water of presumed lowered salinity. It has since been found on the west coast of India (Menon and Nair 1967, 1975) and throughout the coast of southern China (Liu 1992) at depths of 0–25 m. Although the zooids of *S. amoyensis* and its congeners are membraniporiform, they have long been recognised as differing substantially in having polymorphs that resemble avicularia, which are otherwise unknown in malacostegine cheilostomes. These polymorphs are slightly larger than regular autozooids and were first described in *Sinoflustra annae* (Osburn, 1953) by Hastings (1930) [as *Acanthodesia serrata sensu* Hastings, non Hincks, 1882], who noted that they have a normal polypide and parietal muscles. *Sinoflustra* species also have a single ancestrula, not twinned as in membraniporids in the strict sense (see Taylor and Monks 1997).

For these reasons, Liu and Yang (1995) established *Sinoflustra*, which they attributed to the neocheilostome family Flustridae. In addition to the type species *S. amoyensis* they also included *A. annae*. There is one other potential species, originally described as *Alderina arabianensis* Menon and Nair, 1975, but Liu and Yang (1995) included it in the synonymy of *S. amoyensis*. Curiously, Menon and Nair (1975) described both "*Membranipora amoyensis*"



Figs 6–10. *Baudina naturalistae* sp. nov. (holotype figs 6–9): **6**, part of uniserial colony growing proximally on host colony of *Nellia tenella*; **7**, close-up of zooids showing diagnostic characters of orificial processes and large gymnocystal foramina; **8**, bifurcation of zooid row; **9**, orifice and bases of orificial processes; **10**, zooids on *Scrupocellaria* host. Scale bars in μm.

and "*Alderina arabianensis*" in the same paper, each well illustrated, attributing them to different genera and families. Liu (1992), Liu and Yang (1995), and Liu *et al.* (2001) have discussed variability in this species, with the degree of calcification evidently related to salinity (Liu 1992); both spinosity (of opesial and kenozooidal spines) and the relative size of the cryptocyst can vary among populations but the precise causes remain unknown.

One other genus may be allied with *Sinoflustra* (Gordon *et al.* 2006), i.e. *Membraniporopsis* Liu in Liu, Yin and Xia, 1999, attributed by its author to the Membraniporidae. Like *Sinoflustra* it has distinctive distolateral kenozooids, but in the two known species of *Membraniporopsis* – *M. bifloris* (Wang and Tung, 1976) and *M. tubigera* (Osburn, 1940) – these are infundibuliform (somewhat funnel-shaped) with short lateral processes, not spine-like. Two other species may be allied with these genera. Although it has not yet been discovered to have avicularium-like polymorphs, *Membranipora serrilamelloides* Liu and Li, 1987 has short spine-like kenozooids like those of *Sinoflustra annae* and hence probably belongs to *Sinoflustra*. *Conopeum truitti* Osburn, 1944 may be a species of *Membraniporopsis*. Osburn (1944) compared it to *M. tubigera*, commenting on the kenozooidal processes in the zooidal corners. They produce only cuticular tubercles frontally and it is not clear from Osburn's illustrations how the kenozooids originate, so the question is open.

Gordon *et al.* (2006) discussed the relationship between *Sinoflustra* and *Membraniporopsis*, concluding that the two genera were obviously closely related but remarked that, in the absence of information about embryos and/or larvae, choice of a family was uncertain (possibly Electridae or Flustridae), and noted that, if it should turn out that either of these genera should have planktotrophic larvae, then a new family should be created to accommodate them. In the event, McCann *et al.* (2007) [who, like Gordon *et al.* (2006), provisionally included *Sinoflustra* in the Flustridae] noted that Karande and Udhayakumar (1992) had also given some information on reproduction in *S. annae* from western India. In Mumbai harbour waters, *S. annae* co-occurs with three other malacostegine species, all of which have relatively large numbers of small eggs, as is typical of forms that produce planktotrophic cyphonautes larvae. Although Karande and Udhayakumar (1992) did not record cyphonautes larvae in the harbour plankton or attribute such larvae to *S. annae*, they noted that reproductive zooids of *S. annae* contained six to seven small eggs. This is conclusive evidence that *Sinoflustra* is a malacostegine cheilostome, not a neocheilostome. Accordingly, a new family, Sinoflustridae, is created here for the constituent genera *Sinoflustra* (two or three species) and *Membraniporopsis* (two or three species). The Sinoflustridae differs from the Membraniporidae chiefly in having a non-twinned ancestrula and from the Electridae in having distinctive polymorphs – the avicularium-like zooids in *Sinoflustra* and the distolateral kenozooids in both genera.

CHECKLIST OF BRYOZOA FROM BEAGLE GULF AND DARWIN HARBOUR

The checklist of species mostly comprises bryozoans collected during the CCNT surveys (station data in Appendix 1), to which have been added *Amphibiobeania epiphylla*, a remarkable endemic genus and species of mangrove epiphyte (Metcalfe *et al.* 2007), plus some alien species reported by Russell and Hewitt (2000) and *Sinoflustra amoyensis*, found in Darwin Harbour on anthropogenic substrata.

There is a range of colonial morphologies. Of the indigenous species, 26 (33%) are two-dimensional encrusters. This is a smaller proportion of this morphology than would be expected for the total range of habitats available in the Darwin region and may be an artifact of sampling or, what is more likely, subsequent sorting of samples sent for analysis. It is usual for visually obvious erect and large bryozoans to be collected in the field by non-bryozoologists, whereas relatively high diversities of small encrusting species can found on dead molluscan shells, and the samples analysed by the author contained very little such material. Ten additional encrusters form more or less inconspicuous ramifying uni–pluriserial colonies. Fifteen species form fixed-erect colonies that may be tree-like, reticulate or planar from a relatively small attachment point. Nine species (mostly species of *Celleporaria* plus *Cigclisula occlusa*) start life as two-dimensional encrusters but soon become mounded and/or erect and coralline owing to frontal budding of zooids that results in thick, rigid multilamellate colonies. Several of the *Celleporaria* species are large and robust, serving as important substrata for other bryozoans. The most important of these are *C. oculata* and *C. fusca*, which resemble small corals – the latter bore 14 other cheilostome species. One striking growth form is free-living (vagrant), with two exemplars in the Darwin area, viz *Cupuladria guineensis* and *Selenaria punctata*, which form discoidal colonies that live on sandy substrata.

Russell and Hewitt (2000) reported five species of alien/cryptogenic bryozoans from the vicinity of the Port of Darwin. *Bugula neritina*, *Savignyella lafontii* and *Watersipora subtorquata* are distinctive and easily recognised; the records of *Amathia distans* and *Zoobotryon verticillatum* need confirming on the basis of voucher specimens in so far as *A. distans* may be confused with native *Amathia* species and *Z. verticillatum* has some similarities to native *Vesicularia papuensis*.

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CHECKLIST OF BRYOZOA OF BEAGLE GULF

(CCNT Beagle Gulf station numbers given for those species collected during the survey)

Phylum BRYOZOA Ehrenberg, 1831
Class STENOLAEMATA Borg, 1926
Order CYCLOSTOMATA Busk, 1852
Suborder TUBULIPORINA Johnston, 1847
Superfamily TUBULIPOROIDEA Johnston, 1838
Family TUBULIPORIDAE Johnston, 1838
Idmidronea sp. BG/95
Family TERVIIDAE Canu and Bassler, 1920
Nevianipora pulcherrima (Kirkpatrick, 1890) BG/95
Suborder ARTICULINA Busk, 1959
Superfamily CRISIOIDEA Johnston, 1838
Family CRISIIDAE Johnston, 1838
Crisia elongata Milne Edwards, 1838 BG/69, BG/95, BG/122, BG/148, BG/153
Class GYMNOLAEMATA Allman, 1856
Order CTENOSTOMATA Busk, 1852
Suborder EUCTENOSTOMATINA Jebram, 1973
Superfamily ARACHNIDIOIDEA Hincks, 1880
Family NOLELLIDAE Harmer, 1915
Nolella papuensis (Busk, 1886) BG/103
Superfamily WALKERIOIDEA Hincks, 1877
Family AEVERRILLIIDAE Jebram, 1973
Aeverrillia setigera (Hincks, 1887) BG/42, BG/67, BG/69
Family WALKERIIDAE Hincks, 1877
Walkeria atlantica (Busk, 1886) BG/27
Superfamily VESICULARIOIDEA Johnston, 1847
Family VESICULARIIDAE Johnston, 1847
Amathia crispa (Lamarck, 1816) BG/26, BG/46, BG/91, BG/95, BG/160
Amathia sp. BG/69
Vesicularia papuensis Busk, 1886 BG/72, BG/73
Order CHEILOSTOMATA Busk, 1852
Suborder INOVICELLINA Jullien, 1888
Superfamily AETEOIDEA Smitt, 1867
Family AETEIDAE Smitt, 1867
Aetea anguina (Linnaeus, 1758) BG/121
Aetea truncata (Landsborough, 1852) BG/103, BG/122
Suborder MALACOSTEGINA Levinsen, 1902
Superfamily MEMBRANIPOROIDEA Busk, 1852
Family MEMBRANIPORIDAE Busk, 1852
Biflustra savartii auctt. BG/38, BG/57, BG/91, BG/119
Jellyella tuberculata (Bosc, 1802) BG/78
Family SINOFLUSTRIDAE fam. nov.
Sinoflustra amoyensis (Robertson, 1921) Port of Darwin
Suborder NEOCHEILOSTOMINA d'Hondt, 1985
Superfamily CALLOPOROIDEA Norman, 1903
Family ANTROPORIDAE Vigneaux, 1949
Parantropora laguncula (Canu and Bassler, 1929) BG/122, BG/160
Family CALLOPORIDAE Norman, 1903
Parellisina curvirostris (Hincks, 1862) BG/38
Family CUPULADRIIDAE Lagaaij, 1952
Cupuladria guineensis (Busk, 1854) BG/27, BG/28, BG/33, BG/49, BG/77, BG/79, BG/91, BG/97, BG/101, BG/105, BG/113, BG/116, BG/117, BG/123
Family QUADRICELLARIIDAE Gordon, 1984
Nellia tenella (Lamarck, 1816) BG/27, BG/36, BG/38, BG/40, BG/54, BG/67, BG/69, BG/73, BG/95, BG/103, BG/116, BG/119, BG/120, BG/126, BG/144, BG/153
Family FLUSTRIDAE Fleming, 1828
Retiflustra cornea (Busk, 1852) BG/78, BG/82, BG/110, BG/111, BG/127, BG/136, BG/150, BG/159, BG/160, BG/161
Superfamily BUGULOIDEA Gray, 1848
Family BEANIIDAE Canu and Bassler, 1927
Amphibiobeania epiphylla Metcalfe, Gordon and Hayward, 2007 Darwin Harbour
Beania regularis Thornely, 1916 BG/38, BG/67, BG/91, BG/95
Family BUGULIDAE Gray, 1848
Bugula neritina (Linnaeus, 1758) Russell and Hewitt 2000 Port Darwin
Bugula robusta MacGillivray, 1869 BG/95, BG/137
Bugula vectifera Harmer, 1926 BG/95
Family EPISTOMIIDAE Gregory, 1893
Synnotum aegyptiacum (Audouin, 1826) BG/160
Synnotum pembaense Waters, 1913 BG/122
Family CANDIDAE d'Orbigny, 1851
Caberea lata Busk, 1852 BG/48, BG/67, BG/69, BG/73, BG/84, BG/95
Scrupocellaria curvata Harmer, 1926 BG/88, BG/144
Scrupocellaria diadema Busk, 1852 BG/38, BG/40, BG/48, BG/69, BG/84, BG/88, BG/91, BG/95, BG/97, BG/103, BG/113, BG/116, BG/119, BG/121, BG/135, BG/141, BG/160
Scrupocellaria longispinosa Harmer, 1926 BG/95, BG/103
Scrupocellaria spatulata (d'Orbigny, 1851) BG40, BG/95
Superfamily MICROPOROIDEA Gray, 1848
Family CHLIDONIIDAE Busk, 1884
Crepis verticillata Harmer, 1926 BG/91, BG/93, BG/95, BG/103, BG/106, BG/120, BG/121, BG/144, BG/153
Family SELENARIIDAE Busk, 1854
Selenaria punctata Tenison-Woods, 1880 BG/27, BG/47, BG/49, BG/97
Family STEGINOPORELLIDAE Hincks, 1884
Steginoporella dilatata Harmer, 1926 BG/27, BG/127, BG/158

Family THALAMOPORELLIDAE Levinsen, 1909
Thalamoporella novaehollandiae (Haswell, 1880) BG38
Superfamily CELLARIOIDEA Lamouroux, 1821
Family CELLARIIDAE Lamouroux, 1821
Cellaria punctata (Busk, 1852) BG/40, BG/69, BG/95
Suborder ASCOPHORINA Levinsen, 1909
Superfamily CRIBRILINOIDEA Hincks, 1879
Family CRIBRILINIDAE Hincks, 1879
Puellina sp. BG/97
Superfamily CATENICELLOIDEA Busk, 1852
Family CATENICELLIDAE Busk, 1852
Catenicella uberrima Harmer, 1957 BG/67, BG/69, BG/95, BG/103, BG/116, BG/121, BG/137
Family SAVIGNYELLIDAE
Savignyella lafontii (Audouin, 1826) Russell and Hewitt 2000 Port Darwin
Superfamily HIPPOTHOOIDEA Busk, 1859
Family HIPPOTHOIDAE Busk, 1859
Hippothoa calciophilia Gordon, 1984 BG/95, BG/103, BG/119
Family PASYTHEIDAE Davis, 1934
Baudina geographae Gordon, described herein BG/103
Baudina naturalistae Gordon, described herein BG/69, BG/95, BG/103, BG/106, BG/119, BG/122, BG/144, BG/153
Superfamily LEPRALIELLOIDEA Vigneaux, 1949
Family LEPRALIELLIDAE Vigneaux, 1949
Celleporaria aperta (Hincks, 1882) BG/119
Celleporaria discoidea (Busk, 1881) BG/85, BG/91, BG/92, BG/94, BG/97, BG/113, BG/121
Celleporaria fusca (Busk, 1854) BG/38, BG/103, BG/113, BG/121
Celleporaria granulosa (Haswell, 1880) BG/38
Celleporaria oculata (Lamarck, 1816) BG/38, BG/40, BG/48, BG/69, BG/84, BG/88, BG/119, BG/121, BG/122, BG/136, BG/141, BG/144
Celleporaria sibogae Winston and Heimberg, 1986 BG/38, BG/40, BG/46, BG/84, BG/85, BG/92, BG/95, BG/103, BG126, BG/127, BG/160
Celleporaria tridenticulata (Busk, 1881) BG/144
Celleporaria sp. BG/121
Superfamily ADEONOIDEA Busk, 1884
Family ADEONIDAE Busk, 1884
Adeona foliifera Lamarck, 1816 BG/26, BG/81, BG/84, BG/88, BG/93, BG/95, BG/97, BG/99, BG/103, BG/114, BG/119, BG/120, BG/131, BG/143, BG/144
Adeonella intricaria Busk, 1884 BG/50, BG/72, BG/78, BG/83, BG/88, BG/95, BG/103, BG/127, BG/152, BG/160
Adeonella lichenoides (Lamarck, 1816) BG/27, BG/38, BG/40, BG/50, BG/69, BG/80, BG/81, BG/82, BG/95, BG/119, BG/124, BG/147
Superfamily SCHIZOPORELLOIDEA Jullien, 1883
Family SCHIZOPORELLIDAE Jullien, 1883
Schizobrachiella subhexagona (Ortmann, 1890) BG/103, BG/119
Stylopoma duboisii (Audouin, 1826) BG/103
Thornelya perarmata Harmer, 1957 BG/36
Family HIPPOPODINIDAE Levinsen, 1909
Hippopodina feegeensis (Busk, 1884) BG/121, BG/122
Family CHEILOPORINIDAE Bassler, 1936
Cheiloporina haddoni (Harmer, 1902) BG/38
Family LANCEOPORIDAE Harmer, 1957
Calyptotheca australis (Haswell, 1880) BG/38, BG/91, BG/103, BG/119, BG/121, BG/142
Calyptotheca inaequalis Harmer, 1957 BG/103
Calyptotheca wasinensis (Waters, 1913) BG/38, BG/88, BG/92, BG/93, BG/95, BG/122, BG/126
Calyptotheca sp. BG119, BG/121, BG/126, BG/152
Family COLATOOECIIDAE Winston, 2005
Cigclisula occlusa (Busk, 1884) BG/38, BG/69, BG/78, BG/91, BG/95, BG/126, BG/136, BG/144, BG/160
Family PORINIDAE d'Orbigny, 1852
Porina longicollis (Canu and Bassler, 1929) BG/69
Porina vertebralis (Stoliczka, 1865) BG/38, BG/40, BG/42, BG/57, BG/67, BG/87, BG/144
Family MARGARETTIDAE Harmer, 1957
Margaretta tenuis Harmer, 1957 BG/40, BG/148
Family PETRALIELLIDAE Harmer, 1957
Hippopetraliella dorsiporosa (Busk, 1884) BG/40, BG/95, BG/97
Mucropetraliella loculifera Harmer, 1957 BG/38, BG/48, BG/95, BG/103, BG/132, BG/136
Mucropetraliella serrata (Livingstone, 1926) BG/95
Petraliella arafurensis Stach, 1936 BG/81
Superfamily SMITTINOIDEA Levinsen, 1909
Family SMITTINIDAE Levinsen, 1909
Parasmittina hastingsae Soule and Soule, 1973 BG/91
Parasmittina vacuramosa Lu, Nie and Zhong MS *in* Lu, 1991 BG/38, BG/48, BG/91, BG/113, BG/116, BG/119, BG/121, BG/122, BG/124, BG/126, BG/132
Family WATERSIPORIDAE
Watersipora subtorquata (d'Orbigny, 1852) Russell and Hewitt 2000 Port Darwin
Superfamily MAMILLOPOROIDEA Canu and Bassler, 1927
Family CLEIDOCHASMATIDAE Cheetham and Sandberg, 1964
Characodoma laterale (Harmer, 1957) BG/92
Superfamily CELLEPOROIDEA Johnston, 1838
Family CELLEPORIDAE Johnston, 1838
Turbicellepora sp. BG/69, BG/95

Family PHIDOLOPORIDAE Gabb and Horn, 1862

Iodictyum gibberosum (Buchner, 1924) BG/121, BG/149

Reteporella graeffei (Kirchenpauer, 1869) BG/40, BG/46, BG/89, BG/103, BG/148

Reteporella granulata (MacGillivray, 1869) BG/149

Rhynchozoon bifurcum Harmer, 1957 BG/38, BG/78, BG/97, BG/142, BG/152, BG/160

Rhynchozoon incrassatum (Hincks, 1882) BG/67, BG/92

Schedocleidochasma porcellaniforme Soule, Soule and Chaney, 1991 BG/91

Triphyllozoon benemunitum (Hastings, 1932) BG/36, BG/38, BG/39, BG/40, BG/46, BG/48, BG/50, BG/52, BG/67, BG/69, BG/71, BG/81, BG/92, BG/93, BG/95, BG/97, BG/121, BG/129, BG/132, BG/136, BG/137, BG/140, BG/141, BG/142, BG/154, BG/155, BG/156, BG/158

Triphyllozoon hirsutum (Busk, 1884) BG148

Triphyllozoon tubulatum (Busk, 1884) BG/40, BG/103, BG/121

Phylum HEMICHORDATA Bateson, 1885

Class PTEROBRANCHIA Lankester, 1877

Order RHABDOPLEURIDA Fowler, 1893

Family RHABDOPLEURIDAE Harmer, 1905

Rhabdopleura annulata Harmer, 1905 BG/121, BG/126, BG/144

DISCUSSION

The total of 84 bryozoan species in the Beagle Gulf samples is small relative to what may be expected of tropical Indo-Pacific bryozoans for an area this size and it is likely that several hundred more species will be discovered upon further dedicated sampling. Indeed, this is true of the Australian tropical and subtropical bryozoan fauna as a whole. Based on the published literature, Gordon and Bock (2008) cited only 319 species for the entire Great Barrier Reef Province and Torres Strait, whereas perhaps a thousand species may be expected on the basis of what is known about bryozoan species diversity in the tropical Indo-Pacific generally. The finding of a new genus with two new species in the same small area is likely to be indicative of further such finds that will follow from more detailed faunal analysis.

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APPENDIX: CCNT BEAGLE GULF (BG) STATION DATA

(All samples collected 3–9 October 1993)

Stn No.	Location	Latitude S	Longitude E	Depth (m)	Substratum
26	Anson Bay	13°16.08	129°55.92	23	Coarse sand, shale, gravel
27	Anson Bay	13°15.90	129°58.86	19	Coarse sand
28	Anson Bay	13°15.96	130°01.86	20	Coarse sand, shale
33	Anson Bay	13°13.26	130°01.92	9	Coarse sand, shale
36	Anson Bay	13°10.26	129°55.62	15	Coarse sand, shale
38	Anson Bay	13°09.24	130°05.52	20	Barnacle-encrusted gravel
39	Peron Islands	13°07.08	129°56.04	15	Coarse sand, mud
40	Peron Islands	13°06.96	129°58.86	8	Fine mud, rocks
42	Peron Islands	13°04.44	129°56.10	14	Coarse sand, shale
46	Peron Islands	13°00.90	129°58.92	14	Coarse sand, shale
47	Peron Islands	13°00.96	130°01.92	17	Coarse sand, shale
48	Peron Islands	13°00.06	130°04.98	13	Mud, shale, sand
49	Peron Islands	13°57.90	130°01.92	16	Mud
50	Peron Islands	13°57.96	130°04.98	10	Sandy mud
52	Fog Bay	12°54.96	130°07.98	7	Mud, shale
54	Fog Bay	12°54.96	130°15.60	4	Sandy mud
57	Fog Bay	12°51.96	130°14.10	7	Mud, shale
67	Bynoe Harbour	12°40.92	130°33.12	9	Coarse sand, shale
69	Fog Bay	12°40.02	130°19.92	6	Mud
71	Grose Islands	12°36.96	130°16.98	13	Mud
72	Port Patterson	12°35.76	130°26.22	3	Fine sand, silt
73	Port Patterson	12°37.08	130°28.08	14	Mud
77	Port Patterson	12°33.60	130°27.90	16	Sandy mud, gravel
78	Bynoe Harbour	12°34.02	130°32.04	28	Coarse sand, shale, gravel
79	Grose Islands	12°31.02	130°14.04	19	Sand
80	Grose Islands	12°31.02	130°17.22	17	Coarse sand, shale, gravel
81	Grose Islands	12°31.02	130°20.04	15	Gravel (sponge bed)
82	Grose Islands	12°30.96	130°22.92	9	Coarse sand, gravel
83	Bynoe Harbour	12°31.02	130°28.98	28	Sandy mud, gravel
84	Bynoe Harbour	12°31.20	130°31.74	11	Coarse sand, gravel
85	Grose Islands	12°27.96	130°20.16	19	Coarse sand, shale, mud
87	Grose Islands	12°27.90	130°26.70	6	Coarse sand
88	Bynoe Harbour	12°28.02	130°28.98	38	Mud, gravel, rocks
89	Bynoe Harbour	12°28.80	130°32.10	14	Mud, gravel
91	Grose Islands	12°25.44	130°25.92	19	Mud, gravel
92	Bynoe Harbour	12°24.84	130°28.92	17	Coarse sand, gravel
93	Bynoe Harbour	12°24.96	130°31.98	29	Sandy mud
94	Charles Point	12°21.96	130°28.74	34	Mud, gravel
95	Charles Point	12°21.90	130°31.92	15	Gravel (sponge bed)
97	Charles Point	12°21.84	130°37.86	14	Coarse sand, shale
99	Darwin Harbour	12°22.14	130°43.98	20	Sandy mud, shale
101	Charles Point	12°19.02	130°34.02	19	Sand, gravel, mud
103	Charles Point	12°18.96	130°40.74	23	Sandy mud, gravel
105	Darwin Harbour	12°19.02	130°47.10	15	Muddy sand, shale, seagrass
106	Darwin Harbour	12°19.08	130°50.04	12	Mud, gravel, shale
110	Charles Point	12°15.84	130°37.86	27	Sandy mud
111	Charles Point	12°16.08	130°40.98	28	Sandy mud
113	Darwin Harbour	12°15.84	130°47.22	20	Sandy mud, shale
114	Darwin Harbour	12°16.08	130°50.04	18	Mud, gravel, shale
116	Shoal Bay	12°15.96	130°55.86	13	Sandy mud, seagrass
117	Shoal Bay	12°16.08	130°58.98	9	Mud
119	Darwin Harbour	12°12.90	130°47.04	23	Mud
120	Darwin Harbour	12°13.02	130°50.04	22	Coarse sand, shale, mud

APPENDIX: CCNT BEAGLE GULF (BG) STATION DATA (continued)

(All samples collected 3–9 October 1993

121	Shoal Bay	12°13.02	130°52.92	19	Mud
122	Shoal Bay	12°13.08	130°55.98	17	Sandy mud, sparse seagrass
123	Shoal Bay	13°13.02	130°58.98	13	Sandy mud
124	Adam Bay	13°12.36	131°12.72	6	Sandy mud, shale, gravel
126	Darwin Harbour	13°10.08	130°46.92	30	Mud, gravel
127	Darwin Harbour	13°10.02	130°49.86	27	Coarse sand, shale, mud
129	Shoal Bay	13°09.96	130°56.10	15	Gravel
131	Gunn Point	12°09.36	131°08.22	4	Sandy mud
132	Adam Bay	12°10.02	131°11.40	4	Sandy mud, shale, gravel
135	Chambers Bay	12°09.84	131°23.22	7	Mud
136	Shoal Bay	12°06.90	130°49.92	18	Sponge bed
137	Shoal Bay	12°07.02	130°52.92	20	Sponge bed
140	Vernon Islands	12°06.90	131°04.80	13	Coral rubble
141	Vernon Islands	12°07.02	131°07.02	20	Large rock
142	Adam Bay	12°06.90	131°11.04	11	Gravel
143	Adam Bay	12°07.02	131°13.98	9	Mud, shale, gravel
144	Chambers Bay	12°07.08	131°20.04	22	Shale, coral rubble
147	Vernon Islands	12°04.02	131°58.86	33	Shale, gravel
148	Vernon Islands	12°03.96	131°01.92	25	Large rock
149	Vernon Islands	12°04.98	131°08.40	26	Gravel, shale, sand
150	Vernon Islands	12°03.96	131°11.10	22	Gravel
152	Cape Hotham	12°04.02	131°20.04	21	Shale
153	Cape Hotham	12°04.08	131°22.80	6	Sponge bed
154	Vernon Islands	12°01.02	130°58.86	30	Rocky bottom
155	Vernon Islands	12°01.02	131°01.86	38	Shale, gravel
156	Vernon Islands	12°01.20	131°03.96	22	Coarse sand, shale, rocks
158	Vernon Islands	12°01.08	131°11.04	20	Gravel, sand
159	Cape Hotham	12°01.32	131°13.92	34	Coarse sand, shale
160	Cape Hotham	12°00.96	131°16.92	29	Coarse sand, shale, gravel
161	Cape Hotham	12°00.96	131°19.86	22	Coarse sand, shale